We claim:

1. A chromatographic material comprising:

(a) a terminal binding functionality;

(b) a hydrophobic linker comprising at least one functionality that is different from the terminal binding functionality; and

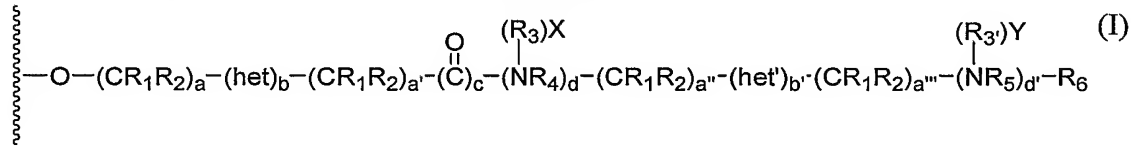
(c) a solid support,

wherein

the hydrophobic linker links the terminal binding functionality to the solid support; and

the chromatographic material is capable of binding bovine albumin at physiological ionic strength.

2. The chromatographic material according to claim 1, wherein the chromatographic material has the following general formula I:



$$\sim\!\!-O-(CR_1R_2)_a-(het)_b-(CR_1R_2)_{a'}-\overset{O}{\overset{\|}{C}}{}_c-(\overset{(R_3)X}{\overset{|}{N}}R_4)_d-(CR_1R_2)_{a''}-(het')_{b'}-(CR_1R_2)_{a'''}-(\overset{(R_{3'})Y}{\overset{|}{N}}R_5)_{d'}-R_6 \qquad (I)$$

wherein

R_1, R_2, R_4, and R_5, at each occurrence, are independently selected from the group consisting of H, C_{1-6}-alkyl, C_{1-6}-alkoxy, C_{1-6}-alkyl-C_{1-6}-alkoxy, aryl, C_{1-6}-alkaryl, -NR'C(O)R'', -C(O)NR'R'', and hydroxy,

wherein R' and R'' are independently selected from C_{1-6}-alkyl, and

wherein no more than one of R_1 and R_2 is hydroxy;

R_6 is selected from the group consisting of H, C_{1-6}-alkyl, aryl, C_{1-6}-alkaryl, -C(O)OH, $-S(O)_2OH$, and $-P(O)(OH)_2$;

R_3 and $R_{3'}$, together with X and Y, respectively, may independently be absent or present, and if present, then R_3 and $R_{3'}$ are independently selected from the group consisting of H, C_{1-6}-alkyl, C_{1-6}-alkoxy, C_{1-6}-alkyl-C_{1-6}-alkoxy, aryl, and C_{1-6}-alkaryl,

wherein X and Y, independently of each other, represent anions;

het and het' are heteroatom moieties independently selected from the group consisting of -O-, -S-, -S(O)-, and $-S(O)_2-$;

a, a', a'', and a''' are independently selected from the integers 0 through 6;

b and b' are independently 0 or 1;

c is 0 or 1, and if c is 1, then $(R_3)X$ is absent;

d and d' are independently 0 or 1; and

the wavy line represents the solid support.

3. The chromatographic material according to claim 2, wherein at least one of a, a', a'', and a''' is 2.

4. The chromatographic material according to claim 3, wherein at least two of a, a', a'', and a''' are 2.

5. The chromatographic material according to claim 3, further wherein at least one of a, a', a'', and a''' is 3.

6. The chromatographic material according to claim 2, wherein at least one of a, a', a'', and a''' is 3.

7. The chromatographic material according to claim 6, wherein at least two of a, a', a'', and a''' are 3.

8. The chromatographic material according to claim 6, wherein a is 3.

9. The chromatographic material according to claim 8, wherein het is S and b is 1.

10. The chromatographic material according to claim 9, wherein a' is selected from the group consisting of 2, 3, 4, 5, and 6.

11. The chromatographic material according to claim 10, wherein b' is 0.

12. The chromatographic material according to claim 11, wherein c and d are both 0.

13. The chromatographic material according to claim 12, wherein d' is 1 and $(R_{3'})Y$ is absent.

14. The chromatographic material according to claim 12, wherein d' is 1 and $(R_{3'})Y$ is present.

15. The chromatographic material according to claim 12, wherein d' is 0.

16. The chromatographic material according to claim 11, wherein c is 1 and d is 1.

17. The chromatographic material according to claim 16, wherein d' is 1 and $(R_{3'})Y$ is absent.

18. The chromatographic material according to claim 16, wherein d' is 1 and $(R_{3'})Y$ is present.

19. The chromatographic material according to claim 16, wherein d' is 0.

20. The chromatographic material according to claim 10, wherein R_1 and R_2 are independently selected from H and C_{1-6}-alkyl.

21. The chromatographic material according to claim 20, wherein each of R_1 and R_2 are H.

22. The chromatographic material according to claim 8, wherein d' is 1.

23. The chromatographic material according to claim 22, wherein $R_{3'}$, R_5, and R_6 are independently selected from the group consisting of H, C_{1-6}-alkyl, aryl, and C_{1-6}-alkaryl.

24. The chromatographic material according to claim 23, wherein $R_{3'}$, R_5, and R_6 are independently selected from C_{1-6}-alkyl and aryl.

25. The chromatographic material according to claim 24, wherein $R_{3'}$, R_5, and R_6 are independently selected from C_{1-6}-alkyl.

26. The chromatographic material according to claim 25, wherein $R_{3'}$, R_5, and R_6 are independently selected from methyl and ethyl.

27. The chromatographic material according to claim 24, wherein one of a'' and a''' is 1 and the other is 1 or 2.

28. The chromatographic material according to claim 25, wherein $(R_{3'})Y$ is absent.

29. The chromatographic material according to claim 8, wherein d' is 0.

30. The chromatographic material according to claim 29, wherein R_6 is H, C_{1-6}-alkyl, aryl, or C_{1-6}-alkaryl.

31. The chromatographic material according to claim 30, wherein R_6 is selected from C_{1-6}-alkyl and aryl.

32. The chromatographic material according to claim 31, wherein R_6 is phenyl.

33. The chromatographic material according to claim 31, wherein one of a'' and a''' is 1 and the other is 1 or 2.

34. The chromatographic material according to claim 29, wherein R_6 is -C(O)OH, $-S(O)_2OH$, and $-P(O)(OH)_2$.

35. The chromatographic material according to claim 34, wherein one of a'' and a''' is 1 and the other is 1 or 2.

36. The chromatographic material according to claim 2, wherein:

a is 3;

a' is 2;

b is 1; and

each R_1 and R_2 in $(CR_1R_2)_a$ and $(CR_1R_2)_{a'}$ is H, except that one of R_2 in $(CR_1R_2)_a$ is optionally OH.

37. The chromatographic material according to claim 36, wherein one of R_2 in $(CR_1R_2)_a$ is OH.

38. The chromatographic material according to claim 37, wherein each of a'', a''', and b' is 0.

39. The chromatographic material according to claim 2, wherein:
a'' is 3;
a''' is 2;
b' is 1; and
each R_1 and R_2 in $(CR_1R_2)_{a''}$ and $(CR_1R_2)_{a'''}$ is H, except that one of R_2 in $(CR_1R_2)_{a''}$ is optionally OH.

40. The chromatographic material according to claim 39, wherein one of R_2 in $(CR_1R_2)_{a''}$ is OH.

41. The chromatographic material according to claim 40, wherein each of a, a', and b'' is 0.

42. The chromatographic material according to claim 2, wherein:
a is 3;
a' is 3;
b is 1; and
each R_1 and R_2 in $(CR_1R_2)_a$ and $(CR_1R_2)_{a'}$ is H.

43. The chromatographic material according to claim 42, wherein each of a'', a''', and b' is 0.

44. The chromatographic material according to claim 2, wherein:
a'' is 3;
a''' is 3;
b' is 1; and
each R_1 and R_2 in $(CR_1R_2)_{a''}$ and $(CR_1R_2)_{a'''}$ is H.

45. The chromatographic material according to claim 44, wherein each of a, a', and b is 0.

46. The chromatographic material according to claim 2, wherein

a is 3;

a' is 5;

b is 1; and

each R_1 and R_2 in $(CR_1R_2)_a$ and $(CR_1R_2)_{a'}$ is H,

47. The chromatographic material according to claim 46, wherein:

b' is 0;

one of a'' and a''' is 2 or 3, the other being 0; and

each R_1 and R_2 in $(CR_1R_2)_{a''}$ and $(CR_1R_2)_{a'''}$ is H, except that one of R_2 in $(CR_1R_2)_{a''}$ and $(CR_1R_2)_{a'''}$ is optionally OH.

48. The chromatographic material according to claim 47, wherein a'' or a''' is 3 and one of R_2 in $(CR_1R_2)_{a''}$ and $(CR_1R_2)_{a'''}$ is OH.

49. The chromatographic material according to claim 2, wherein

a or a' is 3, the other being 0;

a'' or a''' is 3;

each of b, b', and c is 0; and

d is 1.

50. The chromatographic material according to claim 49, wherein d' is 1.

51. The chromatographic material according to claim 2, wherein:

each of R_1 and R_2 are H;

R_3, $R_{3'}$, R_4, R_5, and R_6 are independently selected from the group consisting of H, C_{1-6}-alkyl, aryl, and C_{1-6}-alkaryl;

het is S;

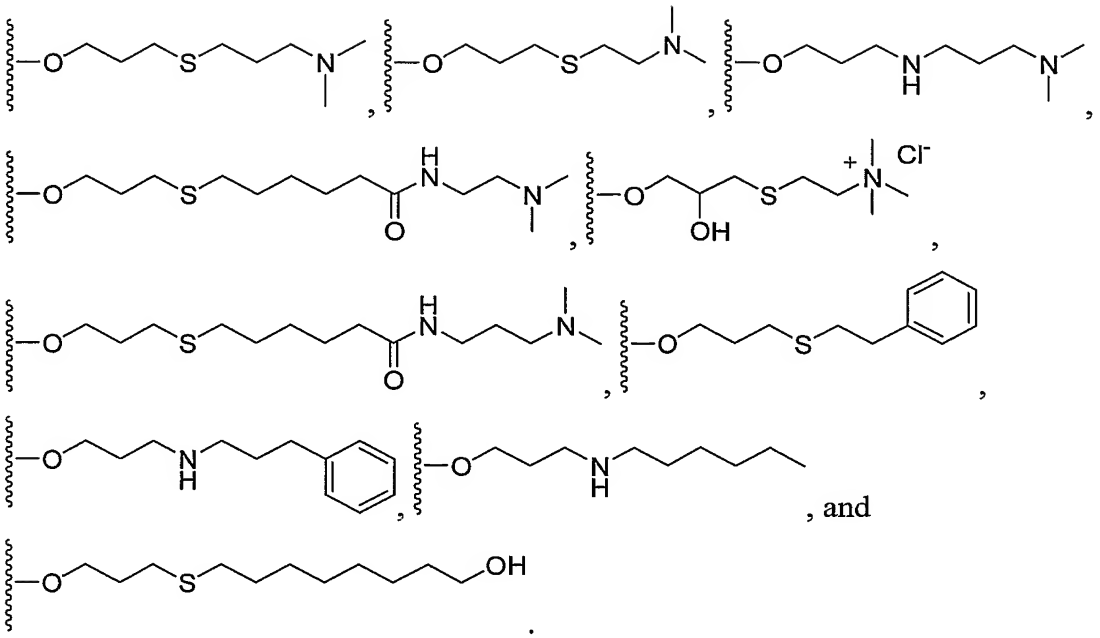
a is 3;

a' is selected from the group consisting of 2, 3, 4, 5, and 6;

one of a'' and a''' is 1 and the other is 1 or 2; and

b is 1 and b' is 0.

52. The chromatographic material according to claim 2, selected from the group consisting of:



53. The chromatographic material according to claim 1, wherein the wherein the solid support is an organic material.

54. The chromatographic material according to claim 53, wherein the organic material is one selected from the group consisting of cellulose, agarose, dextran, polyacrylates, polystyrene, polyacrylamide, polymethacrylamide, copolymers of styrene and divinylbenzene, and mixtures thereof.

55. The chromatographic material according to claim 1, wherein the solid support is an inorganic material.

56. The chromatographic material according to claim 55, wherein the inorganic material is one selected from the group consisting of silica, zirconia, alumina, titania, ceramics, and mixtures thereof.

57. The chromatographic material according to claim 1, wherein the solid support is in the form of a bead or particle.

58. The chromatographic material according to claim 1, wherein the solid support is a planar solid support.

59. The chromatographic material according to claim 58, wherein the chromatographic material is in the form of a biochip.

60. The chromatographic material according to claim 59, wherein the solid support is selected from the group consisting of a metal, metal oxide, silicon, glass, a polymer, and a composite material.

61. The chromatographic material according to claim 59, wherein a multitude of terminal binding functionalities and the hydrophobic linkers to which the terminal binding functionalities are linked are segregated into a plurality of addressable locations on the solid support.

62. The chromatographic material according to claim 59, wherein the biochip is a mass spectrometer probe.

63. The chromatographic material according to claim 61, wherein at least two different addressable locations comprise the same terminal binding functionality and hydrophobic linker.

64. A chromatography column, comprising:

(a) a tubular member having an inlet end and an outlet end;

(b) first and second porous members disposed within said tubular member; and

(c) a chromatographic material according to claim 1 packed within the tubular member between the first and second porous members.

65. The chromatography column according to claim 64, wherein the column volume is between about 1 microliter and about 5000 liters.

66. The chromatography column according to claim 65, wherein the column volume is between about 1 liter and about 100 liters.

67. The chromatography column according to claim 64, further comprising one or more fluid control devices for flowing a liquid sample upward or downward through the chromatographic material.

68. A method for the separation of at least one substance from a sample, comprising:

(a) contacting a chromatographic material according to claim 1 with a liquid sample that comprises at least one substance, whereby the substance adsorbs to the chromatographic material;

(b) adjusting the pH, ionic strength, or both such that the substance desorbs from the resin.

69. The method according to claim 68, further comprising washing the chromatographic material obtained in (a) with an equilibrium buffer.

70. The method according to claim 68, wherein the substance is a biological substance.

71. The method according to claim 70, wherein the biological substance is selected from the group consisting of proteins, viruses, nucleic acids, carbohydrates, oligosaccharides, polysaccharides, lipids, and lipopolysaccharides.

72. The method according to claim 71, wherein the biological substance is a protein.

73. The method according to claim 72, wherein the protein is selected from the group consisting of immunoglobulins, hormones, clotting factors, cytokines, peptides, polypeptides, and enzymes.

74. The method according to claim 73, wherein the protein is an immunoglobulin.

75. The method according to claim 70, wherein the liquid sample is at physiological ionic strength.

76. The method according to claim 75, further wherein in the liquid sample is at physiological pH.

77. The method according to claim 70, wherein the concentration of the biological substance is the physiological concentration.

78. The method according to claim 75, further wherein the liquid sample is at physiological pH.

79. The method according to claim 75, wherein the ionic strength is between about 0.1 M and about 0.2 M.

80. The method according to claim 70, further comprising adjusting the ionic strength of the liquid sample to physiological ionic strength prior to (a).

81. The method according to claim 68, wherein (b) entails only increasing the ionic strength.

82. The method according to claim 70, wherein (b) entails only increasing the ionic strength.

83. The method according to claim 68, wherein the separation is accomplished via fixed bed, fluidized bed, or batch chromatography.

84. A method of detecting an analyte, comprising:

(a) contacting an addressable location of the chromatographic material according to claim 61 with a sample comprising the analyte, thereby fixing the analyte to the chromatographic material; and

(b) detecting the analyte by virtue of its binding to the terminal binding functionality and hydrophobic linker.

85. The method according to claim 84, wherein the detecting is performed in a mass spectrometer.

86. The method according to claim 85, wherein the addressable location is positioned proximately to a laser beam in the mass spectrometer.

87. The method according to claim 86, wherein the detecting comprises irradiating the chromatographic material at the addressable location with a laser pulse for a time and power sufficient to desorb and ionize the analyte.

88. The method according to claim 85, wherein the mass spectrometer is a gas phase ion spectrometer.

89. The method according to claim 84, wherein the sample is a blood sample.

90. The method according to claim 89, wherein the blood sample is a serum sample.

91. A process for making the chromatographic material according to claim 1, comprising:

(a) activating the solid support by contacting the solid support with one functionality of a bifunctional reagent that comprises part or all of the hydrophobic linker to bind the reagent to the solid support; and

(b) reacting the solid support obtained in (a) with a reagent that comprises the terminal binding functionality to form a bond between the hydrophobic linker and the terminal binding functionality.

92. The process according to claim 91, wherein the solid support is an organic material.

93. The process according to claim 92, wherein the organic material is one selected from the group consisting of cellulose, agarose, dextran, polyacrylates, polystyrene, polyacrylamide, polymethacrylamide, copolymers of styrene and divinylbenzene, and mixtures thereof.

94. The process according to claim 91, wherein the solid support is an inorganic material.

95. The process according to claim 94, wherein the inorganic material is one selected from the group consisting of silica, zirconia, alumina, titania, ceramics, and mixtures thereof.

96. The process according to claim 91, wherein the contacting provides discreet spots of activated solid support.

97. The process according to claim 96, wherein the chromatographic material is in the form of a biochip.

98. The process according to claim 91, wherein the bifunctional reagent comprises at least two functional groups independently selected from the group consisting of chloro, bromo, iodo, epoxide, carboxyl, ester, aldehyde, ketone, amido, alkenyl, cyano, and imino.